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The Japanese Species of the Genus *Limnebius* (Coleoptera, Hydraenidae)

Manfred A. JÄCH

Natural History Museum, Burgring 7, A-1014 Wien, Austria

and

Eishi MATSUI

Reimei High School, 495, Hondobaba, Hondo City,
Kumamoto Pref., 863 Japan

Abstract *Limnebius nakanei* (Amami-ohshima) and *L. nakanei okinawensis* (Okinawa) are described. *Limnebius taiwanensis* JÄCH is newly recorded from Japan (Iriomote and Ishigaki). A key to the species is included.

Key words: Coleoptera; Hydraenidae; *Limnebius*; taxonomy; Japan

The genus *Limnebius* LEACH has an almost worldwide distribution. The Palearctic species have been revised by JÄCH (1993). So far only one species (*Limnebius japonicus* NAKANE) has been recorded from the Japanese Archipelago. Extensive field works carried out by the junior author in various parts of Japan yielded a large number of specimens, which contain a new record, one new species and one new subspecies to be described in this paper.

All the Japanese species belong to the *Limnebius atomus* species-group as defined by JÄCH (1993).

Material and Methods

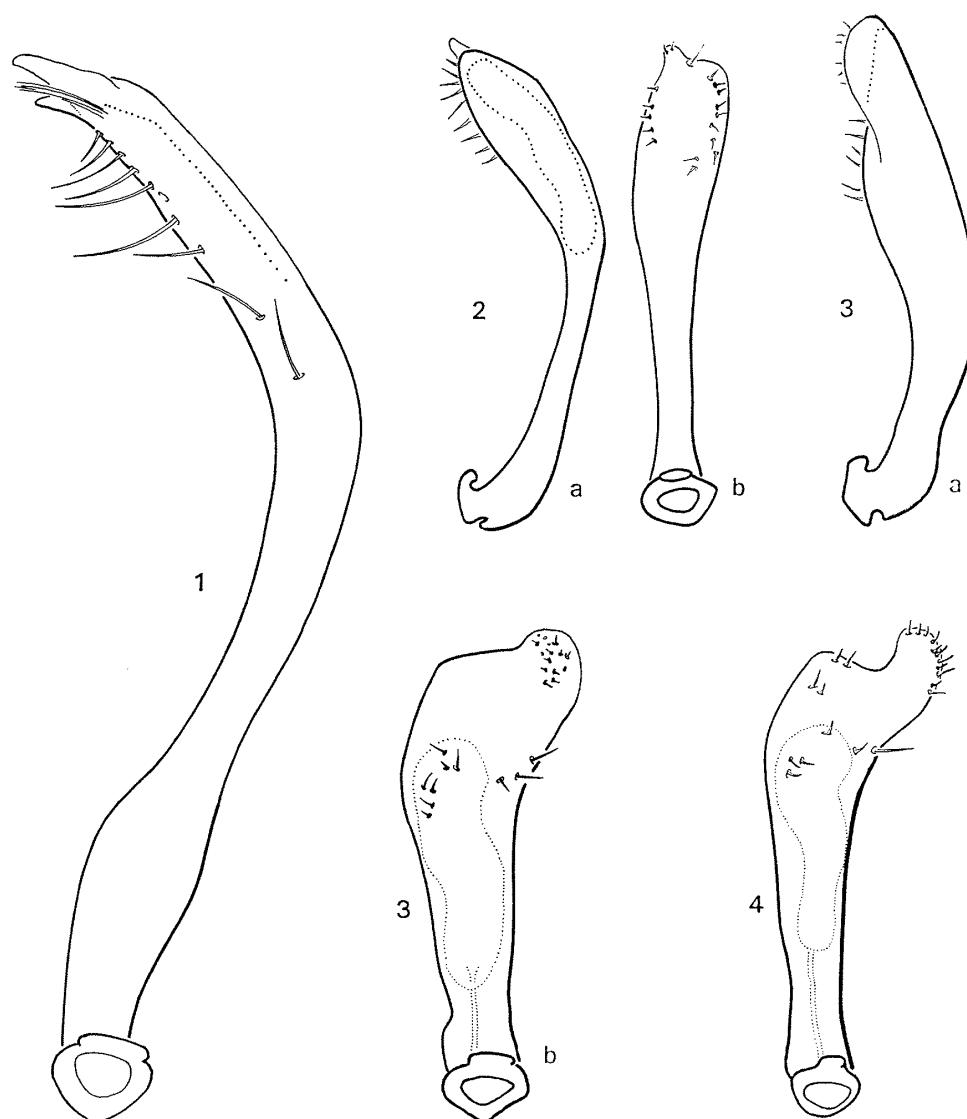
This study is based on 202 specimens, most of which were collected by the junior author; specimens from 8 institutions and private collections as indicated under “acknowledgement and abbreviations” (see below) were examined.

Body length is measured from the front margin of the labrum to the elytral apices.

Scale next to figures represents 0.1 mm.

Acknowledgement and Abbreviations

The material used for this study was borrowed from the following institutions and private collections (abbreviations are used to refer to collections in the text):



Figs. 1–4. Aedeagi. 1, *Limnebius kweichowensis*, ventra aspect; 2, *L. taiwanensis* (a, lateral, b, ventral); 3, *L. nakanei nakanei*, (a, lateral, b, ventral); 4, *L. nakanei okinawensis*, ventral aspect.

CMH	Coll. Matsui, Hondo
CNC	Coll. Nakane, Chiba
ISNB	Institut royal des Sciences naturelles de Belgique, Bruxelles
KUF	Kyushu University, Fukuoka
MHNG	Muséum d'Histoire Naturelle, Geneve
NMW	Naturhistorisches Museum, Wien
SIW	Smithsonian Institution, Washinton, D.C. [= National Museum of Natural History]
UMS	Dept. of Entomology, University of Minnesota, St. Paul

WUN Nagoya Women's University

Our sincere thanks are due to Ph. J. CLAUSEN (St. Paul), T. NAKANE (Chiba) and M. SATÔ (Nagoya) for sending material and valuable information.

Limnebius kweichowensis PU

Limnebius kweichowensis PU, 1951, 49. — JÄCH, 1993, 131.

Limnebius japonicus NAKANE, 1965, 52. — SATÔ, 1985, 204, pl. 37, figs. 23 (in colour). — JÄCH, 1993, 131.

Type locality: “Kweiyang”, Guizhou Province, southern China.

Type material. We have not seen the holotype ♂ or any of the 53 paratypes which are deposited in the collection of C.-L. PU, but the senior author has examined 8 paratypes which are housed in the UMS.

Synonyms. We have examined the holotype ♀ and the paratype ♀ of *L. japonicus* (described from Tabuse, Suwo, Yamaguchi Pref., Honshu, Japan), deposited in the CNC.

More material from China and Japan must be examined to decide if *L. japonicus* can be regarded as a subspecies of *L. kweichowensis*.

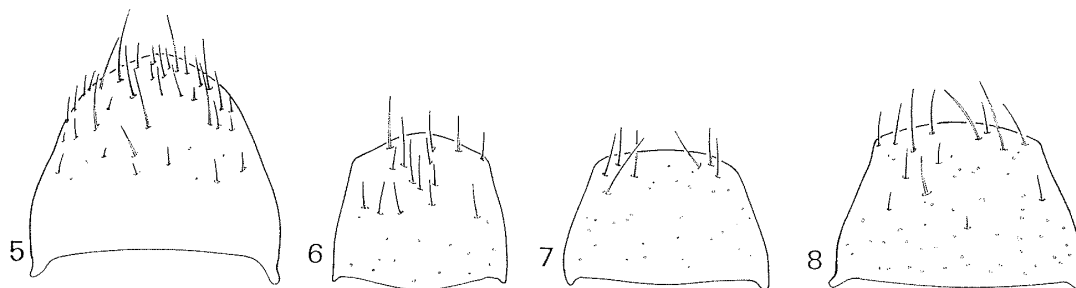
Diagnosis. Length 1.1–1.2 mm log. This species can be distinguished from all the other Japanese species by *L. atomus*-like, drop-shaped body form (length: width=ca. 1.75).

Female sternite IX (Fig. 5) and tergite X (Fig. 9) differ significantly from the respective sclerites of the two other Japanese species. Sternite IX: long, its front margin strongly arched; tergite X: basal margin distinctly notched.

Aedeagus (Fig. 1): Main piece very long and curved (ventral aspect), with a subbasal swelling and a series of approximately 10 setae on the left side of the apical third.

Due to drop-like body form and aedeagal similarities *L. kweichowensis* must be regarded as a species closely related to *L. atomus* DUFTSCHMID from Europe and Siberia.

Distribution. China (Kweiyang and Tushan, Guizhou Province: Beijing); Ja-



Figs. 5–8. Female sternite IX. 5, *Limnebius kweichowensis*; 6, *L. taiwanensis*; 7, *L. nakanei*; 8, *L. boukali*.

pan (Honshu). Japan (Fig. 13): Honshu: Yamaguchi Pref.: type specimens of *L. japonicus* (CNC). Hyôgo Pref.: Murozumi, 28. V. 1949, leg. MIYAMOTO (CNC) Kami-ifuku, Okayama-shi, 3. V. 1945, leg. K. SAKAGUTI (CNC).

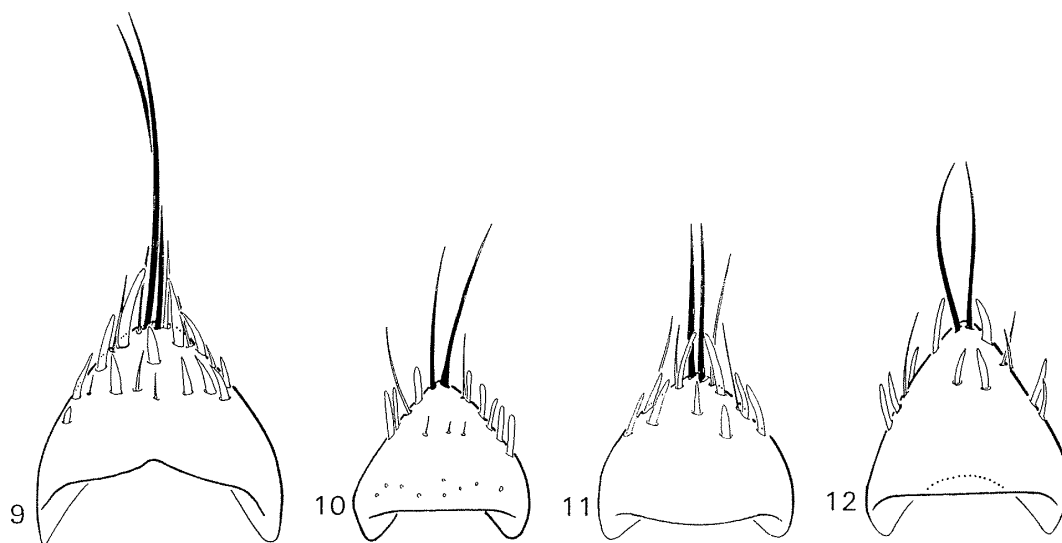
Limnebius nakanei n. sp.

Limnebius sp.: MATSUI, 1988, 117; 1990, 164. — JÄCH, 1993, 159.

Type locality: Kawauchi-gawa River, Uken Village, Amami-ohshima, southern Japan.

Type material. Holotype ♂ (KUF): "Kawauchi River, Uken V., Amami-ohshima, Kagoshima Pref., 27. III. 1988, leg. E. MATSUI". Paratypes: 16 exs., labelled as holotype (CMH, NMW); 5 exs.: "Chinase River, Naze City, Amami-ohshima, Kagoshima Pref., 21. VIII. 1987, leg. E. MATSUI" (CMH, NMW); 1 ♂ + 1 ♀: "Chinaze River, Daiwa V., Amami-ohshima, Kagoshima Pref., 21. VIII. 1987, leg. E. MATSUI" (CNC).

Diagnosis. Length 1.00–1.25 mm long. Body form oblong, almost parallel-sided (length: width=2.0–2.2). Broadest near posterior angles of pronotum and anterior third of elytra. Upper surface only very sparsely covered with very fine adpressed hairs. Coloration brown; head (except for lateral areas of clypeus), middle of pronotum and elytral suture usually darker brown or black. Maxillary palpi short and stout. Front margin of labrum slightly emarginate; labro-clypeal suture arcuate and distinctly impressed. Surface of pronotum smooth and glabrous, usually sparsely punctate. Elytra elongate; moderately densely or densely punctate, especially in basal halves: sides very gently rounded or almost parallel-sided; apices truncately rounded in male, very slightly longer and more acuminate



Figs. 9–12. Female tergite X. 9, *Limnebius kweichowensis*; 10, *L. taiwanensis*; 11, *L. nakanei*; 12, *L. boukali*.

in female; explanate margin very narrow; surface of elytra superficially or more distinctly shagreened, meshes very small; suture not convex at elytral declivity. All legs in male slightly enlarged, basal three segments of male pro- and mesotarsi slightly dilated, with suction setae.

Pygidial sclerites of female: sternite IX (Fig. 7) wide and short (length: width = ca. 0.6), apically only slightly arcuate, thus clearly distinguished from that in the remaining Japanese species. Sternite IX of *L. boukali* JÄCH (described from Primorye) can be distinguished only by its larger size (Fig. 8). Tergite X (Fig. 11) small and short; basal margin slightly sinuous, a character which distinguishes it from any other Japanese species and from *L. boukali* (Fig. 12).

Aedeagus (Fig. 3): Main piece short and stout, apically asymmetrically dilated (ventral aspect), with a few ventral and subapical short setae; capsule large, situated approximately in middle.

Differential diagnosis. The distinct elytral punctation (especially in the basal half) distinguishes this species readily from any other East Asian *Limnebius*.

Distribution (fig. 13). So far known only from Amami-ohshima Island, southern Japan.

Etymology. Named for Dr. Takehiko NAKANE (Chiba City) in recognition of his numerous contributions to the knowledge of the water beetles of Japan.

***Limnebius nakanei okinawensis* n. ssp.**

Type locality: Kize, Nago City, Okinawa Island, southern Japan.

Type material. Holotype ♂ (KUF): "Kize, Nago C., Okinawa-Hontô, 17. VIII. 1989, leg. E. MATSUI". Paratypes: 50 exs, labeled as holotype (CMH, NMW): 31 exs.: "Genka R., Nago C., Okinawa-Hontô, 16. VIII. 1990, leg. E. MATSUI" (CMH, NMW); 7 exs.: "Nuuha R., Ohgimi V., Okinawa-Hontô, 16. VIII. 1990, leg. E. MATSUI" (CMH).

Diagnosis. Length 0.9–1.1 mm long. Externally not significantly different from *L. nakanei nakanei*. Aedeagus (Fig. 4): Can be distinguished from that of *L. nakanei nakanei* by the distinctly emarginate apex (ventral aspect). Other differences such as shape and length of capusle, and distribution of setae are less significant.

Distribution (Fig. 13). So far known only from Okinawa Island, southern Japan.

Etymology. Named in reference to the geographical distribution.

***Limnebius taiwanensis* JÄCH**

Limnebius taiwanensis JÄCH, 1993 155.

Type locality: Dalu, Hsinchu Hsien, Taiwan.

Type material. The holotype ♂ is housed in the NMW; 36 paratypes are deposited in the NMW, MHNG, ISNB, SIW, WUN and Laboratory of Insect Con-

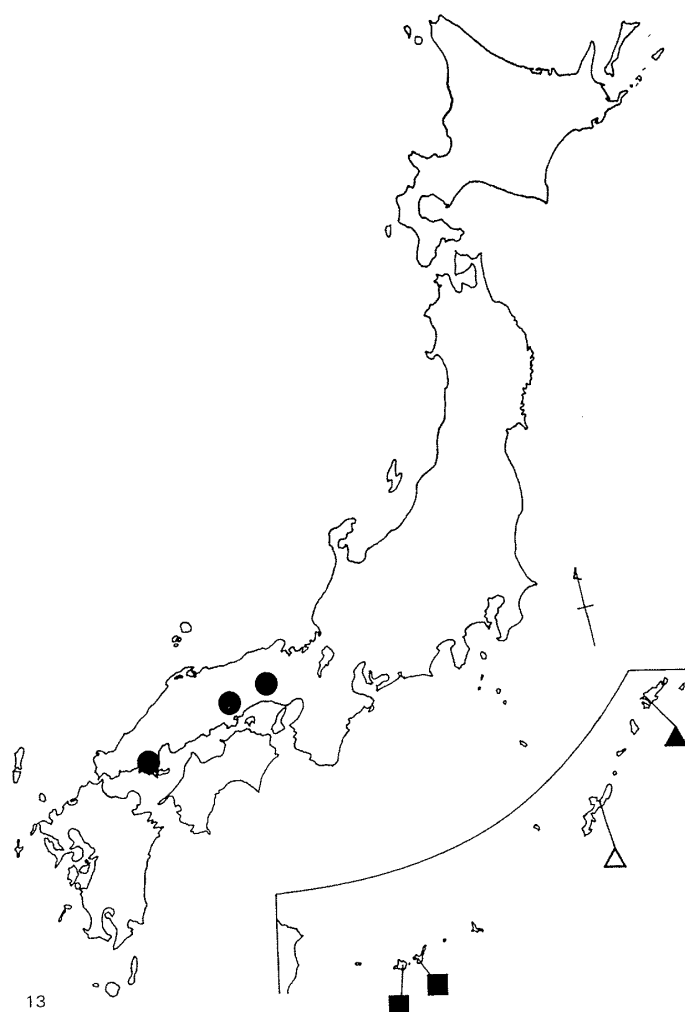


Fig. 13. Geographical distribution of *Limnebius kweichowensis* (black circles), *L. nakaneii* (black triangles), *L. nakaneii okinawensis* (white triangle) and *L. taiwanensis* (black squares) in Japan.

servation, Department of Plant Pathology and Entomology, National Taiwan University, Taipei.

Diagnosis. Length 0.9–1.2 mm long. Body form oblong (length: width=1.9–2.0). Elytra impunctate or very feebly punctate, with small, faintly impressed punctures.

Pygidial sclerites of female: sternite IX (Fig. 6) rather long and narrow (length: width=ca. 1.0), apical margin slightly arcuate; tergite X (Fig. 10) short, basal margin more or less straight. The pygidial sclerites of *L. boukali* (Fig. 8, 12) can be distinguished by the larger size and differences in the proportions (length: width of sternite IX=ca. 0.6 in *L. boukali*).

Aedeagus (Fig. 2): Very small, slender, slightly enlarged in apical half, with numerous short setae in apical third; apex with a short acute protuberance. It can

be distinguished from very similar *L. clavatus* PU (described from Hunan, China) by the longer and more slender shape.

Distribution. Taiwan, Japan (Iriomote, Ishigaki).

Japan (Fig. 13): Ishigaki: 9 exs.: Nishihama-gawa River, 12. VIII. 1989, leg. E. MATSUI (CMH); 5 exs.: Nishihama-gawa River, 5. VIII. 1990, leg. E. MATSUI (CMH); 16 exs.: Sakae, 5. VIII. 1990, leg. E. MATSUI (CMH); 15 exs.: Takeda, 6. VIII. 1990, leg. E. MATSUI (CMH); 6 exs.: Sokobaru, 7. VIII. 1990, leg. E. MATSUI (CMH); 22 exs.: Kara-gawa River, 6. VIII. 1990, leg. E. MATSUI (CMH, NMW). Iriomote: 50 exs.: Komi, 12. VIII. 1998, leg. E. MATSUI (CMH, NMW); 17 exs.: Komi, 9. VIII. 1990, leg. E. MATSUI (CMH).

Key to the Species

A general distinction between the four Japanese species and subspecies of *Limnebius* is facilitated by their geographical distribution. In Japan they are allopatric (see Fig. 13).

1. Body form more or less drop-shaped (length: width=ca. 1.75); aedeagus (Fig. 1) very long and slender; female sternite IX (Fig. 5) apically strongly arched; basal margin of female tergite X (Fig. 9) notched; size: 1.1–1.2 mm; distribution: Honshu *L. kweichowensis*.
- Body form more or less oblong and narrow (length: width=1.9–2.2); aedeagus (Figs. 2–4) considerably shorter; female sternite IX (Figs. 6–7) apically slightly arched or almost truncate; size: 0.90–1.25 mm; distribution: Ryukyu Islands 2
2. Elytra impunctate or very superficially punctate in basal halves; aedeagus (Fig. 2) distinctly curved in lateral aspect, apically not strongly dilated in ventral aspect; female sternite IX (Fig. 6) longer (length: width=ca. 1.0); basal margin of female tergite X (Fig. 10) always straight; distribution: Iriomote and Ishigaki *L. taiwanensis*.
- Elytra distinctly punctate, at least in basal halves; punctures moderately deeply impressed; aedeagus (Figs. 3–4) only slightly curved in lateral aspect, apically very asymmetrically dilated in ventral aspect; female sternite IX (Fig. 7) rather wide (length: width=ca. 0.6); basal margin of female tergite X (Fig. 11) slightly sinuous; distribution: Amami-ohshima and Okinawa 3
3. Apical margin of aedeagus (ventral aspect) only slightly emarginate (Fig. 3) *L. nakanei nakanei*.
- Apical margin of aedeagus (ventral aspect) distinctly emarginate (Fig. 4) *L. nakanei okinawensis*.

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